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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,921	07/22/2003	Mark A. Bernick	2398-031312	7119

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EXAMINER	
MCDONALD, RODNEY GLENN	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 12/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/624,921	BERNICK, MARK A.	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-9,11-15,17 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-9,11-15,17 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

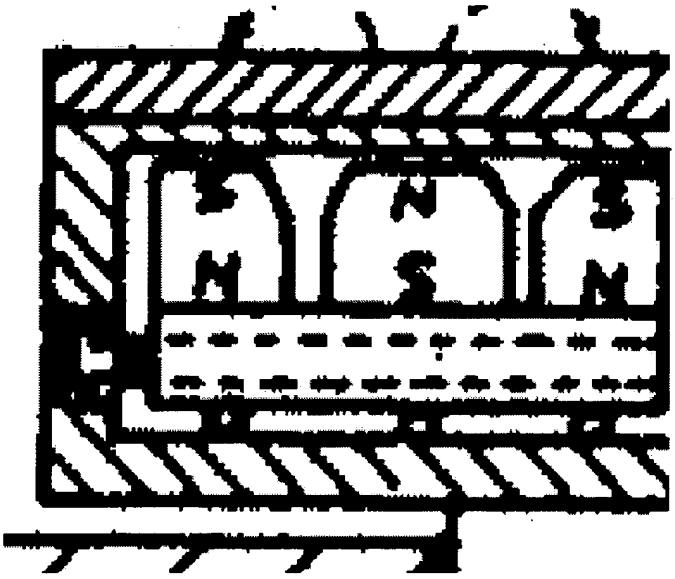
> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 3, 5, 7, 9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masaki et al. (Japan 61-235560) in view of Bernick (U.S. Pat. 5,736,019) and Nakazato et al. (U.S. Pat. 4,631,106).

Regarding claim 1, Masaki teach a sputtering electrode in a sputtering chamber of Figure 1. (See Figure 1) The sputtering electrode comprises a cathode body 5. (See Figure 1) A drive unit –item 41 and screw conveyor is coupled to the cathode body 4. (See Figure 1) A target 3 is received by the cathode body 5. (Figure 1) A magnet arrangement 4 is received within a magnet receiving chamber of the cathode

body 5 and is coupled to the drive unit – item 41 and screw conveyor. The magnet arrangement 4 is comprised of a plurality of magnets adapted for motion relative to the target by the drive unit. (See Figure 1; Abstract) The magnets form a closed loop arrangement for generating a closed loop on the target surface for sputtering material onto the surface of the substrate 6. (See Figures 1 and 3; Abstract) The magnets have profiled top portions with angled portions and flat apex. (See Figure 1; See enlarged Figure). The plurality of magnets are coupled to a support plate which is coupled to the drive unit – 41 and screw conveyor. (See Figure 1)



Regarding claim 2, the plurality of magnets cooperate to generate magnet flux lines which form a closed loop magnetic tunnel adjacent to a front of sputtering surface of the target. (See Figure 1 and Figure 3)

Regarding claim 3, the target appears to be one of a linear target. (See Figure 3)

Regarding claim 7, the magnets move in a linear motion. (See Abstract; Figure 1 double arrows)

Regarding claim 11, the profiled form of the magnets appears to be rectilinear. (See Figure 1)

Regarding claim 12, the contoured top portions of the magnet is one of angled shape or sloped shape. (See Figure 1)

The differences between Masaki et al. and the present claims is that the question as to whether Masaki et al. suggest a closed loop magnet arrangement (Claim 1), the use of a motor (claim 5) and the use of spacer blocks of non-magnetic material with the magnets not extending above the spacer blocks (Claim 1) and the use of a support plate having a plurality of channels to support the magnets (Claim 9).

Regarding the closed loop magnetic arrangement of claim 1, as pointed out above it is believed that Masaki et al. teach the closed loop arrangement given the description shown in their Figures 1 and 3. However, supplementary to this Bernick teach in Figs. 7 and 8 a magnetic arrangement having a closed loop magnet arrangement 146 and additional magnets 144 for forming magnetic fields in front of a target. (See Bernick Figs. 7 and 8; Column 12 lines 62-68; Column 13 lines 27)

The motivation for providing a closed loop magnetic arrangement is that it allows for producing controllable flux lines. (Column 14 lines 41-46)

Regarding the use of a motor of claim 5, Masaki et al. establish a drive shaft in the form of a screw conveyor. Masaki et al. moving mechanism 41 is construed as a motor. (See Masaki Abstract)

The motivation for providing a drive shaft and motor is that it allows for movement of the magnet in order to produce a quality thin film. (See Abstract)

Regarding the use of spacer blocks of non-magnetic material with the magnets not extending above the spacer blocks of claim 1, Nakazato et al. in Fig. 8 shows utilizing non-magnetic spacer material between the magnets with the magnets not extending above the non-magnetic spacer material. (See Fig. 8; Column 6 lines 15-28)

The motivation for utilizing spacer material between the magnets is that it allows for suppressing the space required for movement of the magnetic means. (Column 2 lines 5-13)

Regarding the support plate having a plurality of channels to support the magnets 9, Navasota et al. teach that magnets can be supported in channels of a support pate as shown in Figure 8. (Column 6 lines 15-41; Figure 8)

The motivation for supporting magnets in channels of a support plate is that it allows for spreading the magnets toward the periphery. (Column 6 lines 15-28)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Masaki by utilizing spacer blocks of non-magnetic material with the magnets not extending above the spacer blocks as taught by Nakazato et al. and to utilize a support plate having a plurality of channels to support the magnets as taught by Nakazato et al. because it allows for spreading magnets toward the periphery while suppressing the space required for movement of the magnetic means.

Claims 1-3, 5-7, 9, 11, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Pat. 4,872,964) in view of Bernick (U.S. Pat. 5,736,019), Masaki et al. (Japan 61-235560) and Nakazato et al. (U.S. Pat. 4,631,106).

Regarding claims 1, 13, Suzuki et al. teach a magnetron sputtering electrode in a sputtering device as seen in Fig. 3. (See Fig. 3) The sputtering electrode comprises a cathode body made of a backing plate 14 and cooling chamber 26. (Fig. 3; Column 3 lines 3-6) A drive unit is coupled to the cathode body. The drive unit is made up of shaft 11 and rotation mechanism. (See Fig. 3; Column 2 lines 58-61) A target 13 is received by the cathode body. (Column 2 lines 61-63) A magnet 10 is rotated eccentrically to central axis by the drive unit. (See Fig. 3; Abstract) The magnet 10 is received within the cathode chamber 26. (See Figure 3) The magnet 10 is made up of a closed magnet loop formed from a plurality of magnets shown in Figure 6a. (See Figure 6a) Aluminum alloy is deposited on substrate 16. (See Figure 3; Abstract)

Regarding claims 2, the magnet field is generated in front of the target to achieve uniform erosion. (See Figure 6b; Column 5 lines 27-28)

Regarding claim 3, the target 13 is a circular target. (See Figure 6a)

Regarding claims 5, 13, there is a drive shaft 11 and a rotating unit (interpreted to be a motor.) (Column 2 lines 58-61)

Regarding claim 6, the rotation unit causes rotation about the axis. (See Abstract)

Regarding claim 7, the motion is one of eccentric motion. (See Abstract)

The differences between Suzuki et al. and the present claims is the magnets having a profiled top portion is not discussed (Applies to all the claims), the nonmagnetic spacers are not discussed (Applies to all the claims), the support plate including channels is not discussed (Claim 9), the form of the profiled magnets being one of rectilinear and cylindrical is not discussed (Claim 11), the shape of the contoured top portion is not discussed (Claim 12).

Regarding the use of spacer blocks of non-magnetic material with the magnets not extending above the spacer blocks, Nakazato et al. in Fig. 8 shows utilizing non-magnetic spacer material between the magnets with the magnets not extending above the non-magnetic spacer material. (See Fig. 8; Column 6 lines 15-28)

The motivation for utilizing spacer material between the magnets is that it allows for suppressing the space required for movement of the magnetic means. (Column 2 lines 5-13)

Regarding the support plate having a plurality of channels to support the magnets 9, Navasota et al. teach that magnets can be supported in channels of a support pate as shown in Figure 8. (Column 6 lines 15-41; Figure 8)

The motivation for supporting magnets in channels of a support plate is that it allows for spreading the magnets toward the periphery. (Column 6 lines 15-28)

Regarding the magnets having a profiled top portion, shape of the contoured top portion (Claim 12), Bernick teach that magnets should be shaped in various ways including apexes, concave or convex, etc. at their top portions. (Column 10 lines 23-57)

Masaki et al. also teach shaped magnetic top portions with an inclined portion and a flat top portion. (See Masaki discussed above)

The motivation for utilizing various shaped top portions for the magnets is that it allows for controlling erosion of the target. (Bernick Column 10 lines 42-57)

Regarding the form of the profiled magnets (Claim 11), Bernick suggest rectilinear shapes for the magnets. (Column 10 lines 23-57; Figures 7, 8) Masaki et al. suggest rectilinear configurations for the magnets. (Figures 1 and 3)

The motivation for utilizing various shaped magnets is that it allows for controlling of the erosion of the targets. (Bernick Column 10 lines 42-57)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Suzuki et al. by utilizing nonmagnetic spacers between the magnets and by utilizing channels as taught by Nakazato et al. and by profiling the magnets including the top portions as taught by Bernick and Masaki et al. because it allows for spreading the magnets toward the periphery and for controlling the erosion of the targets.

Claims 8, 14, 15, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. in view of Bernick, Masaki et al. and Nakazato et al. as applied to claims 1-3, 5-7, 9, 11, 12 and 13 above, and further in view of Ogawa (Japan 03-140467) and Fukami et al. (Japan 61-041194).

The differences not yet discussed is the motion having two or more degrees of motion is not discussed (Claims 8, 15) and where the apex is up to half the thickness of the magnet segment (Claims 14, 15).

Regarding the motion having two or more degrees of motion, Ogawa teach that a magnetron can be moved rotationally and linearly utilizing two motors. (See Abstract)

The motivation for moving the magnetron with two or more degrees of motion is that it allows for uniformalizing the film thickness distribution. (See Abstract)\

Masaki et al. is discussed above already establishes the apex of the magnet being flat. (See Masaki discussed above) Fukami et al. teach that magnetic poles apexes should be up to half the thickness of the magnet segment. (See Figures 1, 2a, 2b; pole 8)

The motivation for utilizing an apex that is up to half the thickness of the magnet segment is that it allows for accelerated depositing of a film. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized two degrees of motion as taught by Ogawa and to have utilized an apex of a magnet that is up to half the thickness of the magnet segment as taught by Fukami et al. because it allows for uniformalizing the film thickness distribution and for accelerated depositing of a film.

Response to Arguments

Applicant's arguments filed October 13, 2005 have been fully considered but they are not persuasive.

In response to the argument that the prior art does not teach a plurality of magnets required to be arranged on the support plate such that a portion of the contoured portion of each of the plurality of magnets is positioned beneath an upper surface of the blocks, it is argued that Nakazato et al. teach that t a plurality of magnets

can be arranged on a support plate such that non-magnetic spacing material can be placed between the magnets such that the top portions of magnets are located beneath the upper surface of the non-magnetic spacer portion. (See Nakazato et al. discussed above)

In response to the argument that Suzuki et al. does not teach a magnetron that is capable of more than one degree of movement, it is agreed that upon further review of Suzuki et al. and in light of Applicant's arguments that Suzuki et al. does not teach a magnetron that is capable of more than one degree of movement. However the Examiner has provided a new reference to Ogawa to teach a magnetron that can be moved with more than one degree of movement. It is argued that it would be obvious to one of ordinary skill in the art to utilize a magnetron with more than one degree of movement as suggested by Ogawa.

This action will be made NON-Final so the new references and Examiner's arguments based on these references can be considered.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
December 12, 2005